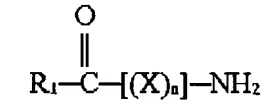
Appl. No. ~~10/337,186~~ 09/882-781
Reply to Office Action of April 30, 2003

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

Claim 1. (currently amended) An antimicrobial peptide represented by Formula I:

Formula I



$$R_1\text{—}C\text{—}[(X)_n]\text{—}NH_2$$

wherein n=2 and $[(X)_2]$ is Arg-Trp; and

~~X is any natural or non-natural, modified or unmodified amino acid except glutamate or aspartate;~~

~~n=1 to5;~~

~~wherein:~~

~~(a) when n=1, then~~

~~said peptide comprises a cationic amino acid;~~

~~the charge of said peptide at neutral pH is +1;~~

~~R_1 is C_1-C_{20} alkyl; C_3-C_6 cycloalkyl; C_4-C_{20} alkenyl; C_4-C_{20} alkynyl; C_1-C_{20} haloalkyl; C_2-C_{20} haloalkenyl; C_3-C_{20} haloalkynyl; C_2-C_{20} alkoxyalkyl; C_2-C_{20} alkylthioalkyl; C_2-C_{20} alkylsulfinylalkyl; C_2-C_{20} alkylsulfonylalkyl; C_2-C_{20} cycloalkylalkyl; C_4-C_{20} alkenyloxyalkyl; C_4-C_{20} alkynyloxyalkyl; C_4-C_{20} (cycloalkyl) oxyalkyl; C_4-C_{20} alkenylthioalkyl; C_4-C_{20} alkynylthioalkyl; C_4-C_{20} (cycloalkyl) thioalkyl; C_2-C_{20} haloalkoxyalkyl; C_4-C_{20} haloalkenyloxyalkyl; C_4-C_{20} haloalkynyloxyalkyl; C_4-C_{20} alkoxyalkenyl; C_4-C_{20} alkoxyalkynyl; C_4-C_{20} alkylthioalkenyl; C_4-C_{20} alkylthioalkynyl; C_4-C_{20} trialkylsilylalkyl; C_1-C_{20} alkyl substituted with NR_3R_4, nitro, cyano, or phenyl optionally substituted with R_5, R_6, and R_7; C_1-C_{20} alkoxy; C_1-C_{20} haloalkoxy; C_1-C_{20} alkylthio; C_1-C_{20} haloalkylthio; NR_3R_4; or phenyl, benzyl, pyridyl, furanyl, thienyl, naphthyl, pyrimidinyl, benzofuranyl, benzothienyl, or quinolinyl each optionally substituted with R_5, R_6 or R_7;~~

~~R_3 is independently hydrogen; C_1-C_4 alkyl; or phenyl optionally substituted with at least~~

~~one R_8;~~

~~R_4 is independently hydrogen; C_1-C_8 alkyl; or phenyl optionally substituted with at least one R_8;~~

~~R_5 is independently C_1-C_6 alkyl; C_1-C_6 alkoxy; C_1-C_6 haloalkyl; halogen; C_2-C_6 alkynyl; C_1-C_6 thioalkyl; phenyl or phenoxy each optionally substituted with at least one R_8; cyano; nitro; C_1-C_6 haloalkoxy; C1-C6 haloalkythio; C_2-C_6 alkenyl; C_2-C_6 haloalkenyl; acetyl; CO_2CH_3; or N(C_1-C_2 alkyl)$_2$;~~

~~R_6 is independently methyl; ethyl; methoxy; methylthio; halogen; or trifluoromethyl;~~

~~R_7 is independently halogen; and~~

~~R_8 is independently halogen; C_1-C_4 alkyl; C_1-C_4 alkoxy; CrC$_4$ haloalkyl; nitro; or cyano;~~

~~(b) when n=2 or 3, then~~

~~at least one of the amino acids is a cationic amino acid;~~

~~the net charge of said peptide at neutral pH is at least +1;~~

wherein R_1 is selected from the group consisting of C_1-C_9 alkyl; and C_3-C_6 cycloalkyl; and ~~; C_4-C_9 alkenyl; C_4-C_9 alkynyl; C_1-C_9 haloalkyl; C_3-C_9 haloalkenyl; C_3-C_9 haloalkynyl; C_2-C_9 alkoxyalkyl; C_2-C_9 alkylthioalkyl; C_2-C_9 alkylsulfinylalkyl; C_2-C_9 alkylsulfonylalkyl; C_3-C_9 cycloalkylalkyl; C_4-C_9 alkenyloxyalkyl; C_4-C_9 alkynyloxyalkyl; C_4-C_9 (cycloalkyl) oxyalkyl; C_4-C_9 alkenylthioalkyl; C_4-C_9 alkynylthioalkyl; C_4-C_9 (cycloalkyl) thioalkyl; C_2-C_9 haloalkoxyalkyl; C_4-C_9 haloalkenyloxyalkyl; C_4-C_9 haloalkynyloxyalkyl C_4-C_9 alkoxylalkenyl; C_4-C_9 alkoxyalkynyl; C_4-C_9 alkylthioalkenyl; C_4-C_9 alkylthioalkynyl; C_4-C_9 trialkylsilylalkyl; C1-C9 alkyl substituted with NR_3R_4, nitro, cyano, or phenyl optionally substituted with R_5, R_6, and R_7;C_1-C_9 alkoxy; C_1-C_9 haloalkoxy; C_1-C_9 alkylthio; C_1-C_9 haloalkylthio; NR_3R_4; or phenyl, benzyl, pyridyl, furanyl, thienyl, naphthyl, pyrimidinyl, benzofuranyl, benzothienyl, or quinolinyl each optionally substituted with R_5, R_6 or R_7;~~

~~R_3 is independently hydrogen; C_1-C_4 alkyl; or phenyl optionally substituted with at least one R_8;~~

~~R_4 is independently hydrogen; C_1-C_8 alkyl; or phenyl optionally substituted with at least one R_8~~

~~R_5 is independently C_1-C_6 alkyl; C_1-C_6 alkoxy; C_1-C_6 haloalkyl; halogen; C_2-C_6 alkynyl; C_1-C_6 thioalkyl; phenyl or phenoxy each optionally substituted with at least one R_8; cyano; nitro; C_1-C_6 haloalkoxy; C_1-C_6 haloalkythio; C_2-C_6 alkenyl; C_2-C_6 haloalkenyl; acetyl; CO_2CH_3; or $N(C_1$-C_2 alkyl$)_2$;~~

~~R_6 is independently methyl; ethyl; methoxy; methylthio; halogen; or trifluoromethyl;~~

~~R_7 is independently halogen; and~~

~~R_8 is independently halogen; C_1-C_4 alkyl; C_1-C_4 alkoxy; C_1-C_4 haloalkyl; nitro; or cyano;~~

~~(c) n=4 or 5, then~~

~~at least two of the amino acids are cationic amino acids;~~

~~the net charge of the peptide at neutral pH is at least +2;~~

~~R_9 is C_4-C_{20} alkyl; C_3-C_6 cycloalkyl; C_4-C_{20} alkenyl; C_4-C_{20} alkynyl; C_4-C_{20} haloalkyl; C_3-C_{20} haloalkenyl; C_3-C_{20} haloalkynyl; C_2-C_{20} alkoxyalkyl; C_2-C_{20} alkylthioalkyl; C_2-C_{20} alkylsulfinylalkyl; C_2-C_{20} alkylsulfonylalkyl; C_3-C_{20} cycloalkylalkyl; C_4-C_{20} alkenyloxyalkyl; C_4-C_{20} alkynyloxyalkyl; C_4-C_{20} (cycloalkyl) oxyalkyl; C_4-C_{20} alkenylthioalkyl; C_4-C_{20} alkynylthioalkyl; C_6-C_{20} (cycloalkyl) thioalkyl; C_2-C_{20} haloalkoxyalkyl; C_4-C_{20} haloalkenyloxyalkyl; C_4-C_{20} haloalkynyloxyalkyl; C_4-C_{20}, alkoxylalkenyl; C_4-C_{20} alkoxyalkynyl; C_4-C_{20} alkylthioalkenyl; C_4-C_{20} alkylthioalkynyl; C_4-C_{20} trialkylsilylalkyl; C_1-C_{20} alkyl substituted with NR_3R_4, nitro, cyano, or phenyl optionally substituted with R_5, R_6, and R_7; C_1-C_{20} alkoxy; C_1-C_{20} haloalkoxy; C_1-C_{20} alkylthio; C_1-C_{20} haloalkylthio; NR_3R_4; or phenyl, benzyl, pyridyl, furanyl, thienyl, naphthyl, pyrimidinyl, benzofuranyl, benzothienyl, or quinolinyl each optionally~~

~~substituted with R_5, R_6 or R_7;~~

~~R_3 is independently hydrogen; C_1-C_4 alkyl; or phenyl optionally substituted with at least one R_8;~~

~~R_4 is independently hydrogen; C_1-C_3 alkyl; or phenyl optionally substituted with at least one R_8;~~

~~R_5 is independently C_1-C_6 alkyl; C_1-C_6 alkoxy; C_1-C_6 haloalkyl; halogen; C_2-C_3 alkynyl; C_1-C_6 thioalkyl; phenyl or phenoxy each optionally substituted with at least one R_8; cyano; nitro; C_1-C_6 haloalkoxy; C_1-C_6 haloalkythio; C_2-C_6 alkenyl; C_2-C_6 haloalkenyl; acetyl; CO_2CH_3; or $N(C_1$-C_2 alkyl$)_2$;~~

~~R_6 is independently methyl; ethyl; methoxy; methylthio; halogen; or trifluoromethyl;~~

~~R_7 is independently halogen; and~~

~~R_8 is independently halogen; C_1-C_4 alkyl; C_1-C_4 alkoxy; C_1-C_4 haloalkyl; nitro; or cyano.~~

wherein the antimicrobial peptide inhibits the growth of a microbe selected from the group consisting of bacteria, archaea, fungi, algae, protozoa, multicellular parasites and viruses.

Claim 2. (cancelled)

Claim 3. (cancelled)

Claim 4. (cancelled)

Claim 5. (cancelled)

Claim 6. (original) The antimicrobial peptide of claim 1 wherein said peptide is incorporated into a polymer.

Claim 7. (original) The antimicrobial peptide of claim 6 wherein said polymer is selected from the group consisting of a polysaccharide, a glycol polymer, a polyester, a polyurethane, a polyacrylate, a polyacrylonitrile, a polyamide, a polyolefin, a polystyrene, a vinyl polymer, a

polypropylene, silk, a biopolymer, and mixtures thereof.

Claim 8. (cancelled)

Claim 9. (cancelled)

Claim 10. (cancelled)

Claim 11. (cancelled)

Claim 12. (cancelled)

Claim 13. (cancelled)

Claim 14. (cancelled)

Claim 15. (cancelled)

Claim 16. (cancelled)

Claim 17. (cancelled)

Claim 18. (cancelled)

Claim 19. (cancelled)

Claim 20. (cancelled)

Claim 21. (cancelled)

Claim 22. (cancelled)

Claim 23. (cancelled)

Claim 24. (cancelled)

Claim 25. (cancelled)

Claim 26. (cancelled)

Claim 27. (cancelled)

Claim 28. (cancelled)

Claim 29. (cancelled)

Claim 30. (currently amended) A substrate coated with the antimicrobial of claim ~~1~~ 16.

Claim 31. (cancelled)

Claim 32. (new) The substrate of Claim 30, wherein the substrate is selected from a group consisting of personal care products, health care products, household products, food preparation surfaces, food packaging surfaces, medical devices, wound dressings, surgical staples, membranes, shunts, surgical gloves, tissue patches, prosthetic devices, wound drainage tubes, blood collection and transfer devices, tracheotomy devices, intraocular lenses, laboratory devices, textile products and painted surfaces.

Claim 33. (new) The antimicrobial peptide of claim 1, further comprising a carrier selected from the group consisting of a pharmaceutically acceptable carrier, and industrially acceptable carrier, a household product, and a personal care composition.

Claim 34. (new) The antimicrobial peptide of claim 1, wherein the antimicrobial peptide terminates the growth of the mircrobe.

Claim 35. (new) The antimicrobial peptide of claim 1, wherein the antimicrobial peptide is administered topically.